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GALVANONARCOTIC TANK FOR MEASURING AND WEIGHING EELS (*)

by Pierre Lamarque (**)

1. Introduction

While most fish are relatively easy to measure and weigh, this is not the case with eels because of their continual contorsions. With these fish, it is common practice to use anesthetics, but there are a number of drawbacks to the use of these drugs.

As a result, the I.N.R.A. Census Methodology Laboratory (Laboratoire de Méthodologie des Inventaires) developed a galvanonarcotic tank (Gosset, 1974) for the quick and easy measurement of eels. The main characteristics of this tank are described below.

2. Measuring the Eels

The 40 x 70 x 10 cm tank is watertight and insulated. Metal plates, constituting the electrodes, cover each of the two short ends. The bottom of the tank is marked off in centimeters with the "zero" mark at the anode. There are also intermediate graduations.

The tank is filled to a level of 3 to 5 mm. Reducing the amount of water used to a minimum facilitates handling.

(*) This paper was presented at the CIEM/CECPI Symposium on eel research and rational exploitation, held in Helsinki in June 1976.

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A transistorized converter fed by a small cadmium-nickel battery with an incorporated battery charger supplies the constant direct current needed. Voltage may range from 30 to 100 V as measured by a potentiometer to adapt to the conductivity of the water. By way of illustration, only 30 to 40 V are needed in this tank to produce galvanonarcosis in water with a conductance value of 300 µS/cm.

A lot of 10 eels is placed into the tank once the current has been applied. To ensure the same degree of immobility among the eels, it is preferable for each lot to be made up of eels of equal length (3-4 cm margin of variation).

Once the eels are in the tank, they are allowed to swim about under the effect of the current. Then, each eel is placed by hand with its head toward the anode. This rapidly immobilizes the fish which remains perfectly straight. Thereafter, it is a simple matter to bring the head of the fish against the anode and read the length of the animal on the bottom of the tank.

Eels can remain for over half an hour in a state of galvanonarcosis without feeling the effects of the current. They begin to swim again as soon as the current is interrupted.

The constant direct current used is without any danger to humans at the voltage levels employed. The operator can place his hands into the tank without noticing any effects, except in the case of conducting water. In this instance, a rubber glove should be worn on the left hand.

3. Weighing the Eels

Weights may be determined from weight-length charts, if available. Weight-length ratios, however, seem to be subject to substantial variations, depending on the biotopes. Furthermore, the fish have to be weighed to establish these ratios.

If it is necessary to weigh the fish by means of conventional methods with anesthesia, then, it becomes pointless to use the galvanonarcotic tank. For this reason the Laboratory added a device to the tank for weighing the eels without interfering with galvanonarcotic-induced immobility (Fig. 1 and 2).

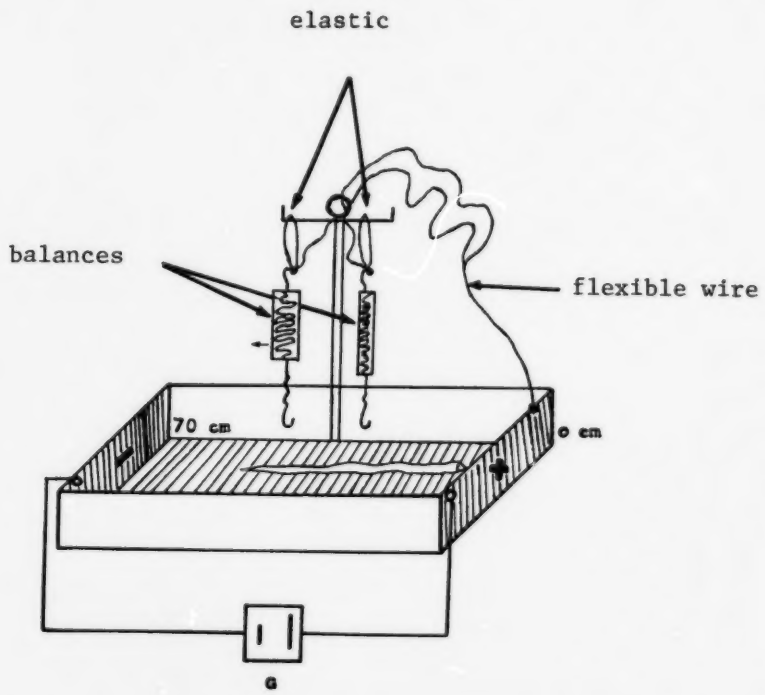

Fig. 1. Diagram of the device for weighing under galvanonarcosis

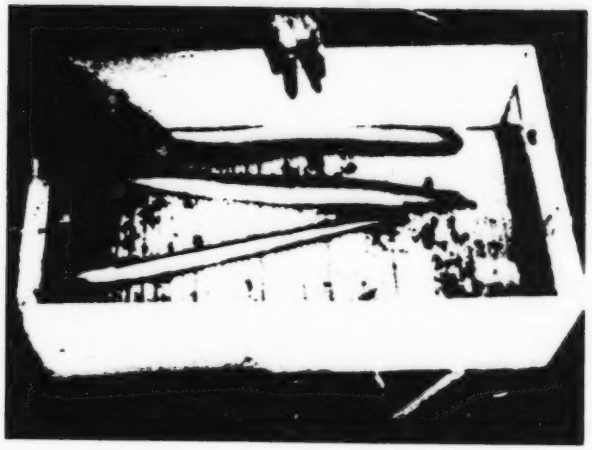

Fig. 2. Eels under galvanonarcosis during measuring operations.

A support is installed on the tank at roughly the midpoint of one of the long sides. Several balances (the number depending on the weight classes involved) are hung from the support by means of flexible elastics which provide for maneuverability while holding the balances in place. The balances spring back into position after weighing.

Plastic balances conduct current internally. If the balances are made entirely of metal, they must be insulated on the outside with plastic sheeting. The top part of the balance is attached to the anode by a flexible conducting wire. The bottom part bears a hook with a foam tip.

The operator introduces the balance hook into the gill opening as the eel lies immobile in the tank. He then raises the balance until the eel's tail is only 1 to 2 mm in the water. The operator can read the weight with the eel in an immobile state. If the tail is very close to the anode, the amount of

current flowing through the animal may be too small to maintain galvanonarcosis and the eel may move. The animal should then be brought closer to the cathode. This will increase the intensity of the paralysing current.

If at the time of placing the hook, the head is relatively far from the anode, the potential gradient to which the animal is subjected will suddenly rise when the hook comes in contact with the head. This will make the eel move its head, making it harder to introduce the hook. The problem may be reduced by bringing the eel's head closer to the anode and avoiding a sudden variation in current.

Instead of placing a hook in the gill opening, the operator may use a metal clamp (alligator clip) to grasp the eel by the bottom jaw. This technique demands a word of caution. As the clamp is brought close to the eel's mouth, the gradient in the vicinity increases, causing tetanic closure of the mouth. This makes it difficult to introduce the clamp. Introduction of the latter may be facilitated by attaching a curved metal wire to the clamp. The end of the wire is placed in contact with the posterior portion of the head, roughly at the level of the pectoral fins. Electrical stimulation of this part of the body causes the animal to open its mouth wide, thereby allowing the clamp to be properly positioned. This procedure can also make it easier to place jaw tags. Regardless of whether the hook or clamp technique is used, the operator will quickly find the approach that suits him best. One last cautionary note. When the bottom of the tank is marked off, the numbers should be written so that they can be clearly read with the anode to the right of the operator. If this is not done, the operator, unless he is left-handed,

will find it very difficult to place the hook or clamp on the eel or will be forced to read the numbers upside down.

4. Conclusions

The electronarcotic tank is now systematically employed by the Laboratory for all fish, but has proved particularly useful in the case of eels.

It can be used for observations, taggings and the reading of tags. It results in a considerable saving in handling time and is quickly learned.

Bibliography

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